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INTERIM REPORT
MONITORING WELL INSTALLATION,
SOIL AND GROUND WATER SAMPLING
CANTRALL FARM MARKET
CANTRALL, ILLINOIS

FOR KAISER ALUMINUM & CHEMICAL CORPORATION

JOB NO 00921 069 122
AUGUST 6, 1990

1670253-001
SANGAMON CO
CANTRALL / KAISER
FOS

DAMES & MOORE

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EXECUTIVE SUMMARY

Small farm market sites throughout the midwest have been handling large volumes of agricultural chemicals, including fertilizers herbicides, and pesticides for over 30 years Recently these operations have become a concern due to the potential impact of these facilities to the environment The Cantrall Illinois facility is one such agricultural chemical operation

Dames & Moore has been contracted by Kaiser to evaluate the presence or absence of environmental impacts resulting from past farm market operations at their Cantrall facility Since the closure of the facility in January of 1988, all chemical storage/mixing tanks and agricultural products have been removed from the site

Preliminary analysis of site soils indicated the presence of several chemicals apparently related to the farm market operation Subsequent more detailed analysis of the site soils and the installation of three monitoring wells in 1989, have indicated that agricultural chemicals are contained in the soils and ground water at the site This interim report of monitoring well installation and soils and ground water sampling describes the site concentrations and field observations made during the fall, 1989 sampling period

1 0 INTRODUCTION

Dames & Moore has undertaken a program of investigation and site improvement at the inactive Kaiser Estech Agricultural Chemicals facility (farm market) in Cantrall, Illinois

Phase I	Literature Review
Phase II	Site Reconnaissance
Phase III	Geophysical Survey
Phase IV	Monitoring Well Installation/Soil and Ground Water Sampling
Phase V	Site Improvement/Soil and Ground Water Sampling

A report entitled *Cantrall Farm Market Preliminary Site Investigation* (Dames & Moore, March 7, 1989) was submitted to the Illinois Environmental Protection Agency (IEPA) that summarized the findings of a program of investigation at the site This included the site description, site history, geology, hydrology, ground water and soil quality, and a geophysical survey A subsequent meeting between representatives of the IEPA, Kaiser Aluminum and Chemical Corporation (Kaiser), and Dames & Moore resulted in an agreement that additional site investigation was required in order to acquire design data for the development of a detailed scope of work for the site improvements phase

Additional data collection at the Cantrall site took place in November of 1989, and constituted the Phase IV activities The results of the Phase IV monitoring well installation and soil and ground water sampling program for 1989 are contained in this report

1 1 SITE BACKGROUND AND DESCRIPTION

The Cantrall farm market property, owned by Kaiser, was operated as a distribution center for agricultural chemicals and various other agricultural supplies during 1964 through 1987 Kaiser sold its farm chemical supply operations (Agricultural Chemicals Division) to Estech Chemical (Estech) in 1984 The business was operated by Kaiser-Estech from 1984 through 1987 under the names 'Kaiser Agricultural Chemicals" or "Kaiser-Estech " Operations at the Cantrall farm market site ceased in January of 1987, and the property was subsequently returned to Kaiser Since Kaiser is no longer in the farm supply business the facility remains closed and there are no plans for future operation at the site Kaiser has contracted Dames & Moore to characterize the current site conditions

and to evaluate the possibility that facility operations may have affected local soil and ground water conditions

The Cantrall site is located in the small farming community of Cantrall, Illinois (estimated population of 150) situated approximately 10 miles north of Springfield on U S Highway 29 (Figure 1) The main portion of the farm market site is located on a triangular shaped lot located north of the railroad tracks in central Cantrall Second Street, Holland Street and Third Street for the east, north and west site boundaries, respectively (Figure 2) The railroad right of-way forms the southern site boundary, with the exception of the southeastern corner of the property, where a small triangular-shaped section of the site extends south of the railroad tracks Residential areas are found beyond the northern and the southern boundaries of the site Undeveloped, grassy areas are located beyond the east and west borders of the property The main property slopes gently upwards toward the north, a low-lying area parallels the railroad tracks (Figure 2) Site surface water drainage appears to be toward the southeast based on site observations and inspection of local topographic maps

1 2 SITE HISTORY

Historically, Kaiser s first record of site development at the Cantrall farm market site is the operation of a grain elevator on the site from the early 1900s to the early 1950s Subsequently, a poultry facility was operated on the site until 1964 During these periods, no information is available as to the materials used or stored onsite Kaiser began leasing the property in 1964 for storage and distribution of its agricultural chemicals The property was purchased in 1967 by Kaiser In 1984, Kaiser sold its entire farm chemicals business to Estech In 1987, Estech ceased operations at the site and returned the property to Kaiser

The majority of the farm market activities were conducted in the northeastern portion of the site, in the area between Holland Street and the slope above the low-lying area along the railroad right-of way Kaiser records and employee interviews indicate locations of former above-ground liquid storage tanks, which have since been removed from the site, where bulk fertilizer and herbicides were stored prior to distribution Most of the tanks were situated on concrete pads that remain on the site to the present time One of the liquid storage tanks was apparently portable The tanks were located near the south and west sides of the small wood frame office and storage building, which remains on the

northeast portion of the site (Figure 2) Two scale pits are located along the north and east sides of the wooden building near Holland Street, however, the scale on the north side of the building was apparently functional only when the site was used as a grain storage/shipping facility Water used onsite was supplied by a well located in the northwest portion of the property In 1976, Kaiser constructed a containment dike and ditch along the edge of the slope directly south of the tank storage areas, in order to control any possible spills or runoff from tank cleaning activities Site operations were discontinued in 1987 and the property was returned to Kaiser; the facility was subsequently closed in January of 1988 All remaining inventory and tanks were removed from the site to eliminate the possibility of future releases

2 0 SITE INVESTIGATIONS

Site investigations during the fall of 1989 included onsite monitoring well installation ground water sampling and surface soil sampling

2 1 MONITORING WELL INSTALLATION

Three ground water monitoring wells (MW-1, MW 2 and MW-3) were installed at the Cantrall site on October 9 and 10 1989 The wells were positioned to determine ground water flow direction and monitor the ground water quality in the uppermost water-bearing zone beneath the facility (Figure 2) The monitoring wells were installed to approximately 15 feet below the ground surface

Professional Service Industries, Inc (PSI) of Springfield, Illinois was used to drill the borings and install the monitoring wells at the site The borings were advanced by a Central Mining Equipment (CME) -55 truck-mounted drill rig equipped with 3-1/4-inch inner-diameter (ID) hollow-stem augers Subsurface soil samples were collected with a 2-inch outer diameter (OD) stainless steel split-spoon sampler (ASTM 1586) Soil samples were logged and described in the field by a Dames & Moore geologist for color, texture, and general appearance

An exploratory boring (EB 1) was advanced to the bedrock surface to examine and confirm the nature of the overlying sediments prior to the placement of the monitoring wells The exploratory boring was located on the north side of the property along Holland Avenue (Figure 2)

Upon completion of each boring 2 inch schedule 40 polyvinyl chloride (PVC) monitoring wells were installed in the boreholes The wells were equipped with 5 foot, 0 010-inch slot PVC screens A silica sand pack was placed in the annular space around the screened interval to provide communication with the shallow aquifer A 2-foot-thick bentonite pellet seal was then placed above the sand pack The remainder of the annular pace was filled with a cement/bentonite grout to the ground surface At the surface, a lockable, steel protective casing was placed around each PVC monitoring well

After installation, the monitoring wells were developed by hand bailing with a 2 inch ID stainless steel bailer until the water was clear of sediments Following well development, the uppermost point of the inner casing of each well was surveyed to an elevation of ±0 01 foot with respect to an arbitrary datum elevation of 100 feet assigned to the top of the concrete casing at the existing Kaiser well An identification number was then placed on the outside of each well

2 2 GROUND WATER SAMPLING

Ground water samples were collected on November 21, 1989 from two of the three monitoring wells (MW-1 and MW 2) MW-3 was not sampled due to inadequate sample volume Due to the difficulty in purging an adequate volume of water from the Kaiser production well, sampling this well was determined to be nonrepresentative Prior to the collection of ground water samples, ground water levels were measured to the nearest 0 01 foot with an Olympic well probe The samples were collected using a precleaned stainless steel bailer, which was decontaminated between usage Decontamination consisted of a distilled water rinse, a dilute nitric acid rinse, and a triple rinse of distilled water The monitoring wells were sampled after purging at least three well volumes of ground water or until the well became dry Ground water samples were tested for the following parameters

Agricultural Parameters	Pesticide Parameters
Ammonia-nitrogen	Metolachlor
Nitrate nitrogen	Alachlor
Nitrite nitrogen	Atrazine
Mineral nitrogen	Metribuzin
Total phosphorus	Butylate

To comply with quality assurance/quality control (QA/QC) procedures during ground water sampling, a field blank was collected In addition, to measure laboratory QA/QC, a laboratory blank was analyzed

The samples were placed in precleaned containers provided by the analytical laboratory and labeled with the appropriate well number, parameters to be analyzed, date, and time of collection All containers were then put in coolers, packed with blue ice, and cooled to approximately 4°C for preservation Each cooler was accompanied with a completed chain of custody and shipped via Federal Express to Minnesota Valley Testing laboratories in New Ulm, Minnesota

2 3 SURFACE SOIL SAMPLING

Onsite surface soil samples (depth of 0 to 6 inches) were collected from a grid that divided the site into 18 sectors of 2,500 square feet each (Figure 2) Five samples were collected from each of the sectors four on a systematic grid (25 feet on center), and one discretionary sample In certain locations where the sectors contained site structures, some samples were not collected This occurred in sectors SS-2 and SS-3 Additionally, some samples were not collected due to property boundary constraints These included SS-13, SS-14, SS-17, and SS-18 Samples from each sector were composited in order to statistically represent the average contaminant concentration within the individual areas Composite samples were placed into a precleaned stainless steel pan and mixed prior to placement into the sample containers Samples were analyzed during the November 1989 sampling event for the pesticides metolachlor, alachlor, aldrin, DDD, dieldrin, atrazine, cyanazine, metribuzin, simazine, butylate, nitrate nitrogen, and total Kjeldahl nitrogen In addition, a number of agronomic parameters were included in the soil analysis to further characterize the surficial site soils

3 0 GEOLOGY

The geology of Sangamon County, Illinois generally consists of Quaternary-age glacial drift overlying bedrock of Pennsylvanian age The thickness of glacial drift is highly variable, between 0 and 200 feet In Sangamon County, lenses of coarser material are sometimes exposed as water-bearing units These units are typically located near the base of the till Below the drift, bedrock consists of shale with discontinuous beds of limestone, sandstone, and coal

In the area of Cantrall drilled wells finished in bedrock indicate a nonwater-bearing shale of Pennsylvanian age with small discontinuous beds of water-bearing sandstone and limestone Locally, bedrock surface is highly variable and ranges from surface exposures to depths of approximately 40 feet Glacial drift overlies bedrock The glacial deposits are predominantly a complex of ice laid till and water-laid silt, with sand and gravel outwash Thin lenses of water-bearing sand are typically located in contact with bedrock However, these aquifers produce a very low yield

Domestic well log data for the Cantrall area indicates that the consolidated glacial drift consists of a pebbly yellow clay till with thin discontinuous beds of sand at the base near the contact with bedrock A thin hardpan layer, 0 to 2 feet thick, is commonly found just above bedrock Blue shale denotes the top of bedrock Discontinuous sandstone units have been located at depths 100 feet below the surface

4 0 HYDROLOGY

4 1 REGIONAL HYDROLOGY

The predominant regional surface drainage feature in Sangamon County is the Sangamon River, a generally east west flowing tributary of the Illinois River The stream essentially dissects the county on an east-west line, thus influencing both surface water and ground water flow towards the center of its valley and in its downstream direction Numerous small tributaries alter this pattern locally

The area around Cantrall is situated on gently rolling terrain north of the Sangamon River Cantrall Creek, a tributary of the Sangamon River, flows from north to south along the east side of Cantrall, this creek and several smaller tributary drainages influence local surface drainage towards the south and east A small tributary to Cantrall Creek flows northwest to southeast just west of the Kaiser site Surface drainage at the Cantrall farm market is towards the southeast, along a southeast sloping grassy area that parallels the railroad tracks, ultimately flowing towards Cantrall Creek However site ground water flow follows a more south-southwesterly trend, being influenced by the northwest-southeast flowing tributary to Cantrall Creek, and another tributary of Cantrall Creek that flows west to east, which is located south of the town

Due to the relatively low permeability of glacial clays and tills, and the nature of and mineral constituents in local shale bedrock the availability of ground water for domestic or industrial use in the Cantrall area is limited by both quantity and quality factors Most domestically usable ground water is provided by lenses of silt, sand, and gravel in the glacial overburden These shallow aquifer units are often only a few inches thick and are found within 40 feet of the surface Water bearing fractures in the upper 50 feet of bedrock can yield up to 4 gallons per minute and some discontinuous water bearing sandstones, found 100 feet below the surface, have produced up to 5 gallons of water per minute However, these zones of water-bearing shallow bedrock are not widely distributed, and water derived from bedrock at depths beyond 150 feet below ground surface is usually too highly mineralized for most purposes

4 2 SITE HYDROLOGY

Boring logs from the onsite monitoring wells indicate that a water-bearing zone is present approximately 12 to 16 feet beneath the site The water-bearing zone appears consistent across the site and is comprised of clayey silts with some sands The unit is approximately 10 to 15 feet in thickness and overlies a dry hard glacial till

Water level measurements indicate that the ground water flows in a south-southwesterly direction with a gradient of approximately 0 012 (dimensionless units) (Figure 3)

During the ground water sampling event in November 1989, slug (recovery) tests were performed on onsite monitoring wells MW-1 and MW-2 in order to estimate the characteristics of the water-bearing zone (Appendix B) The following was calculated based on the results of the tests

	MW-1	MW 2	
	11/21/89	11/20/89	11/21/89
Hydraulic conductivity (ft/s)	$9\,0 \times 10^{-7}$	$1\,0 \times 10^{-5}$	$6\,5 \times 10^{-6}$
Lateral flow velocity (ft/yr)	2 2	24 8	16 1

5 0 GROUND WATER AND SOIL ANALYSIS

5 1 GROUND WATER

Three monitoring wells were installed to evaluate the ground water quality beneath the site (Figure 2) Boring logs for the individual monitoring wells are provided in Appendix A The monitoring wells were developed and subsequently sampled on November 21, 1989 for pesticide and for agricultural chemical parameters including, alachlor, atrazine, butylate, metribuzin, and metolachlor

Laboratory analyses show that all of the pesticide compounds listed above were detected in monitoring wells MW-1 and MW 2 (Table 1) At the time of well development, monitoring well MW-3 had an inadequate ground water sample volume and consequently was not sampled In addition the onsite Kaiser production well could not be purged of three well volumes of water to collect a sample, as a result, any analyses of this would be invalid The Kaiser production well was used for water level measurements

Of the two wells analyzed, monitoring well MW-2 contained the highest level of atrazine (526 04 ppb) alachlor (72 55 ppb) butylate (87 4 ppb), and metolachlor (69 42 ppb) Monitoring well MW-1 contained the highest concentration of metribuzin (75 01 ppb) Total pesticides were most elevated in MW-2 (786 91 ppb) followed by MW 1 (301 0 ppb)

In addition to the pesticides analyses agricultural parameters were analyzed, including nitrate nitrogen, ammonia nitrogen, mineral nitrogen, and phosphorus (Table 1) The nitrate nitrogen concentration was highest at MW 2 (786 ppm, Table 1) Ammonia nitrogen was highest at MW-1 (3 36 ppm) Mineral nitrogen and the phosphorus concentrations were both highest at MW 2 (Table 1)

The elevated pesticide and agricultural parameters at MW-2 and, to a lesser extent, at MW-1 may relate to the occurrence of past site loading or cleaning activities in proximity to the individual monitoring well locations (Figure 2)

5 2 SOIL ANALYSIS

Soil analyses indicated the presence of numerous pesticides in the site soils, including metolachlor, alachlor aldrin, DDD dieldrin, atrazine, cyanazine, metribuzin, simazine, and butylate (Table 2) The most recurring pesticides included alachlor, dieldrin, and cyanazine which were detected in all soil sampling sectors Atrazine and metribuzin occurred in 17 of the 18 sectors at the site Atrazine was the most concentrated parameter sampled with a high concentration of 149 7 ppm (SS-3, Table 2) The most elevated total pesticide concentrations were located in SS 3(196 85 ppm) and SS-11 (31 22 ppm) Pesticide loading took place in sector SS 3 and in SS-11 some cleaning activities took place when the site was in operation Sectors SS-10, SS-4, SS-12, and SS-13 also exhibited elevated levels of total pesticides

The site soils were also sampled to evaluate the existing agricultural parameter concentrations Of the 25 parameters measured, the most important indicators of site conditions are the organic matter percentage, total nitrogen, ammonia nitrogen, and acidity The organic matter percentage was highest in sectors away from areas of the site where loading and cleaning operations took place, including SS-6, SS-7, SS-13, SS 14 and SS 15 (Table 3) The total nitrogen concentration was highest for the portions of the site used for loading or liquid transfer of fertilizer including SS 9, SS-2, SS-12, and SS-11 (Table 3) Ammonia nitrogen concentration was highest in sector SS 9, which was the area where an above-ground ammonia fertilizer tank was located when the facility was in operation (Table 3) The soil acidity (pH) of the site was generally slightly above 7 0, indicative of a slightly alkaline site soil condition (Table 3) The calcium and the magnesium concentrations for the site reflect the presence of crushed limestone that was used over large portions of the site to support truck traffic (Table 3)

6 0 CONCLUSIONS

The 1989 program of site characterization at the Cantrall Illinois Kaiser facility has been completed and includes ground water and soil analyses This program has established a systematic baseline of soil and ground conditions at the site for future comparative analyses

6 1 GROUND WATER

Analytical results indicate that the ground water beneath the site contains alachlor, atrazine, butylate, metribuzin and metolachlor Of the five compounds, atrazine was most concentrated ranging up to 526 04 ppb (MW 2) Total pesticide concentration was highest at MW-2 (786 91 ppb), which is downgradient of former loading areas Nitrate nitrogen was also elevated at MW-2 (786 ppm)

6 2 SOIL

Numerous pesticide compounds have been detected in the site soils In decreasing amounts of total site concentration the most concentrated pesticides detected were atrazine (226 ppm), cyanazine (75 7 ppm) metolachlor (56 18 ppm), and butylate (14 7 ppm) In addition, dieldrin, metribuzin alachlor, aldrin simazine, and DDD were also detected

The pesticide and agricultural parameter analytical results collected from site soils indicate that there is localized soil contamination at the site The total pesticide concentration in the soils appears to be centered around the west side of the existing site building where loading and distribution occurred during site operations (Figure 4) Pesticide contamination is present in sectors SS-3, SS-4, SS-10, SS-11, and SS-12 (Table 2, Figure 4)

Nitrate nitrogen is elevated in an area that is somewhat similar to that for pesticides, although site activities involving nitrate nitrogen materials appear to have been centered more around the eastern side of the site building (Figure 5)

Fertilizer contamination is encountered in sectors SS 9 and SS-2 where loading occurred, and in sectors SS-12, SS-1, and SS 11 where vehicles may have been parked or cleaned (Figure 5)

7 0 1990 WORK PLAN

Dames & Moore recommends as a logical next step that site work in 1990 at the Kaiser Farm Market in Cantrall, Illinois, include, but not be limited to, the following office building and existing structures demolition, source area reduction activities, and site grading

7 1 DEMOLITION

The abandoned frame office building, while onsite, remains a safety liability due to its age accessibility and lack of security In addition existing concrete structures should be removed to facilitate site grading (Section 7 4) Dames & Moore recommends that the building and other existing structures be demolished and disposed of in a landfill All footings and foundation walls should be broken up and removed Care should also be taken not to remove excessive amounts of soil

7 2 SOILS

Soil sampling conducted in November 1989 has shown that the surficial extent of soil pesticide and nitrate contamination appears to be localized (Figures 4 and 5) These analyses show that elevated pesticides are predominantly encountered west of the scale pits and onsite structures, whereas elevated nitrates are found east of the scale pits and onsite structures The localized nature of elevated total pesticide and total nitrogen concentrations at the ground surface indicates that soil removal offsite may be a viable alternative Following removal of site structures, an evaluation plan will be proposed However, prior to the initiation of soil removal the aerial and depth profile in those areas for pesticides and nitrogen needs to be examined to estimate the volume of soil to be remediated

7 3 SOURCE REDUCTIONS

Several areas onsite remain as potential source areas These include the scale pits, site soils and debris, and the existing Kaiser production well The following subsections address steps to be taken to minimize and/or eliminate the impact of the scale pits and Kaiser well as potential source areas

7 3 1 Scale Pits

Two scale pits exist on the Kaiser property These pits are presently filled with water from runoff and precipitation To eliminate the potential of the scale pits acting as sumps for surface water runoff and, consequently a potential source area of contamination, Dames & Moore recommends that water from the scale pits be pumped into a tanker for

offsite disposal All pumped water will be sampled and characterized for subsequent transport by Rollins, Inc to their disposal facility in Baton Rouge, Louisiana

After all water has been pumped, the scale pits will be inspected by Dames & Moore personnel for holes and/or cracks The bottom of the pit will be perforated to allow adequate drainage and the sidewalls will be removed to a depth of approximately 4 feet Upon removal, the soils beneath the former scale pits will be sampled and analyzed for pesticides and agricultural parameters In this manner we can determine if the pits are a source If no cracks and/or holes are observed the pit will be backfilled to grade with the ground surface

This information should indicate whether the scale pits acted as a source of contamination Once sampled, the scale pit excavations will be backfilled to grade with clean soil material from offsite

7 3 2 Kaiser Production Well

The Kaiser production well is constructed of 36 inch diameter, jointed concrete casing and concrete cap This type of construction often provides a conduit for surface water infiltration along the concrete perimeter This would allow the well to act as a conduit for surface water contamination to the subsurface and/or a potential source area resulting from the accumulation of surface water runoff The plan is to close the well to eliminate the physical hazard presented by an unprotected well on the site

The Kaiser well will be sealed according to state of Illinois regulations for wells in unconsolidated formations by using neat cement (1 5 percent bentonite by volume) below the water bearing zone, sand and gravel at the water bearing zone, and neat cement to the surface The existing well casing will be removed to a depth of 10 feet below the ground surface All decommissioning services will be completed by a qualified subcontractor

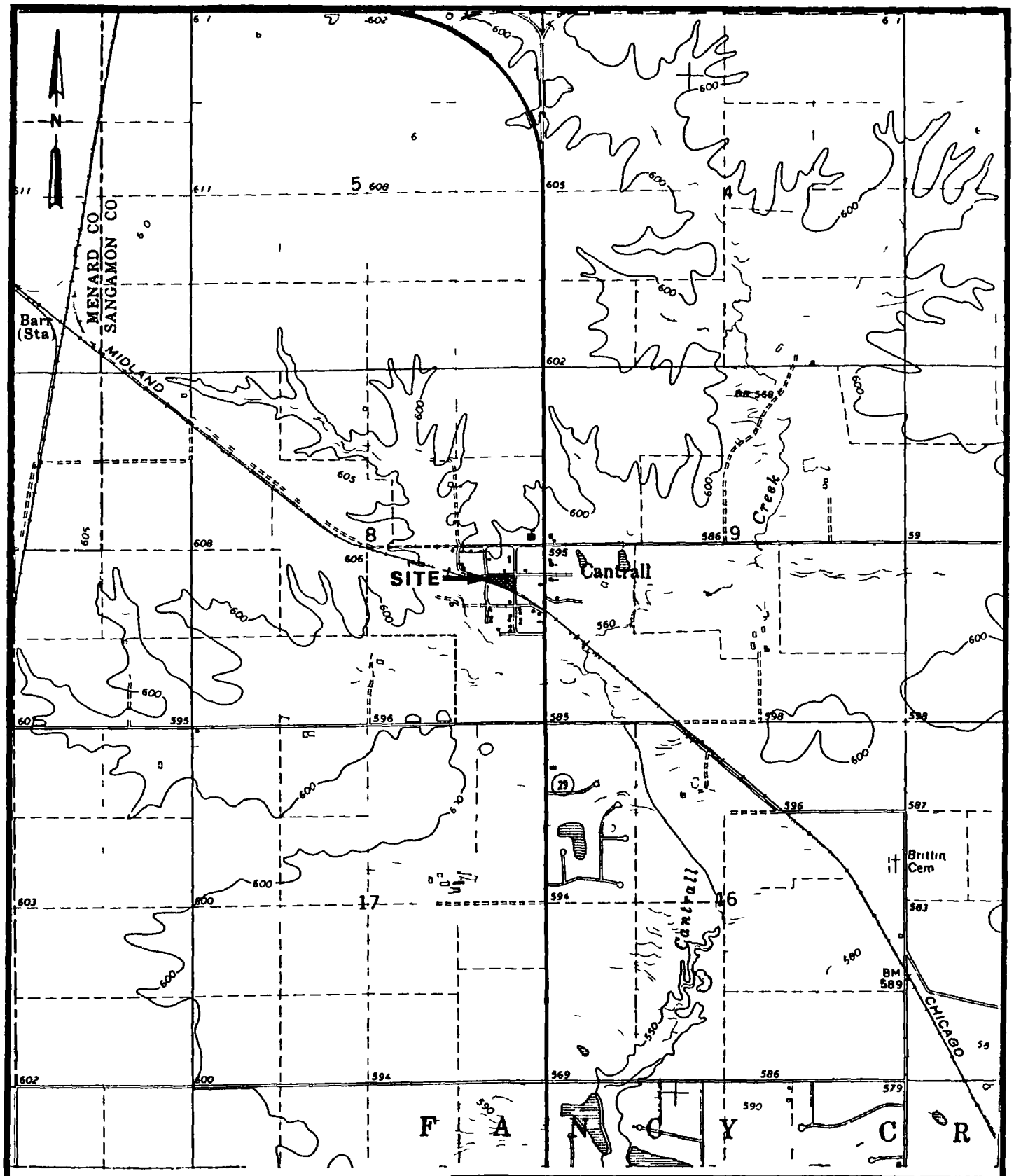
7 4 SITE GRADING

At the conclusion of the above mentioned activities, the Kaiser site will be graded to prevent ponding and control surface water runoff to adjacent properties The site will be graded to the south southeast to promote surface water runoff towards the existing drainage ditch

7 5 GROUND WATER

Ground water sampling conducted in November, 1989, has shown that elevated concentrations of pesticides and certain agricultural parameters are present Newly installed monitoring wells MW-1 and MW-2 have not served to define the downgradient extent of ground water contamination

Upon completion of site cleanup we will develop a monitoring well plan to address deficiencies in the ground water data

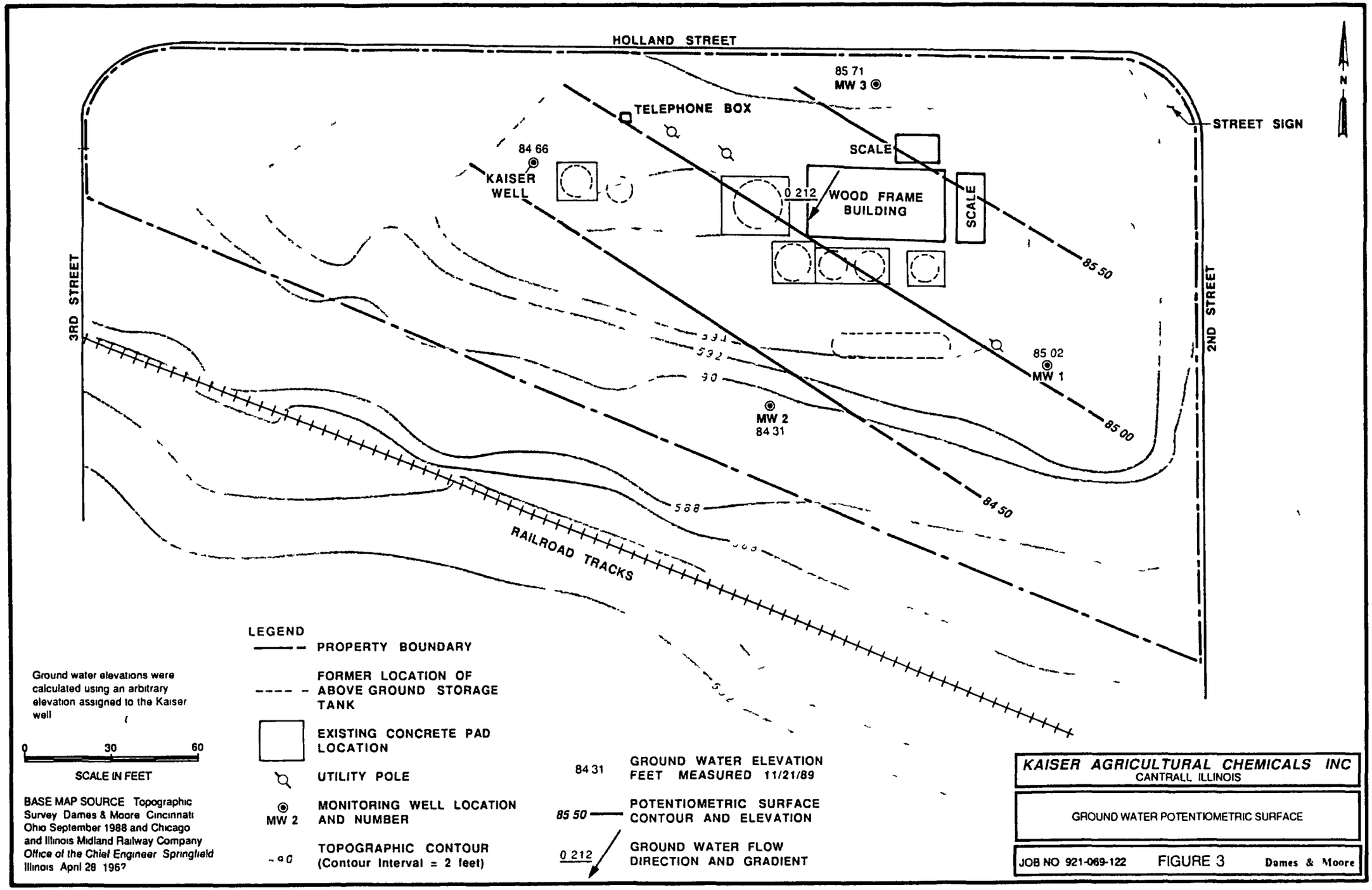


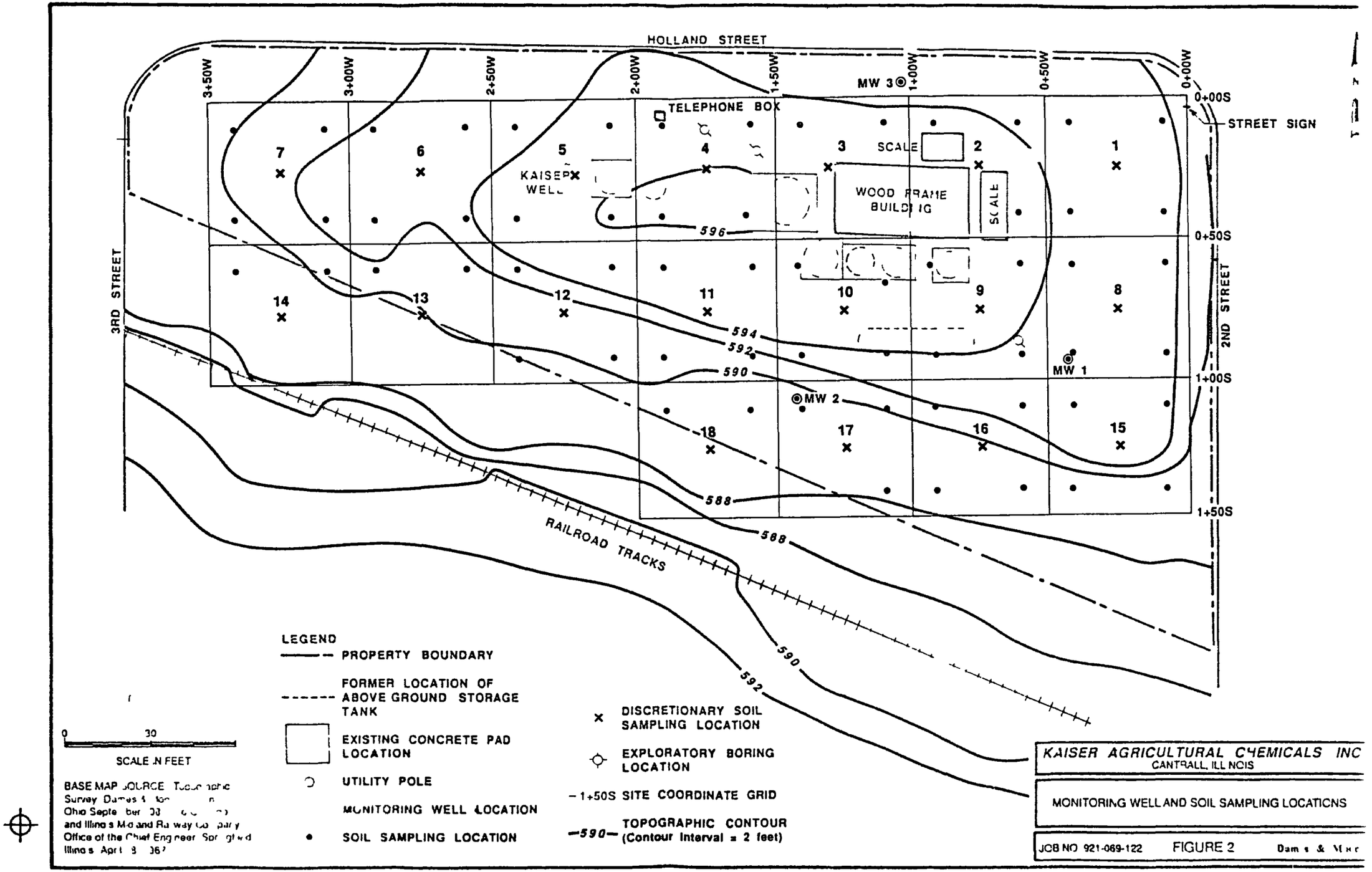
KAISER AGRICULTURAL CHEMICALS, INC
CANTRALL ILLINOIS

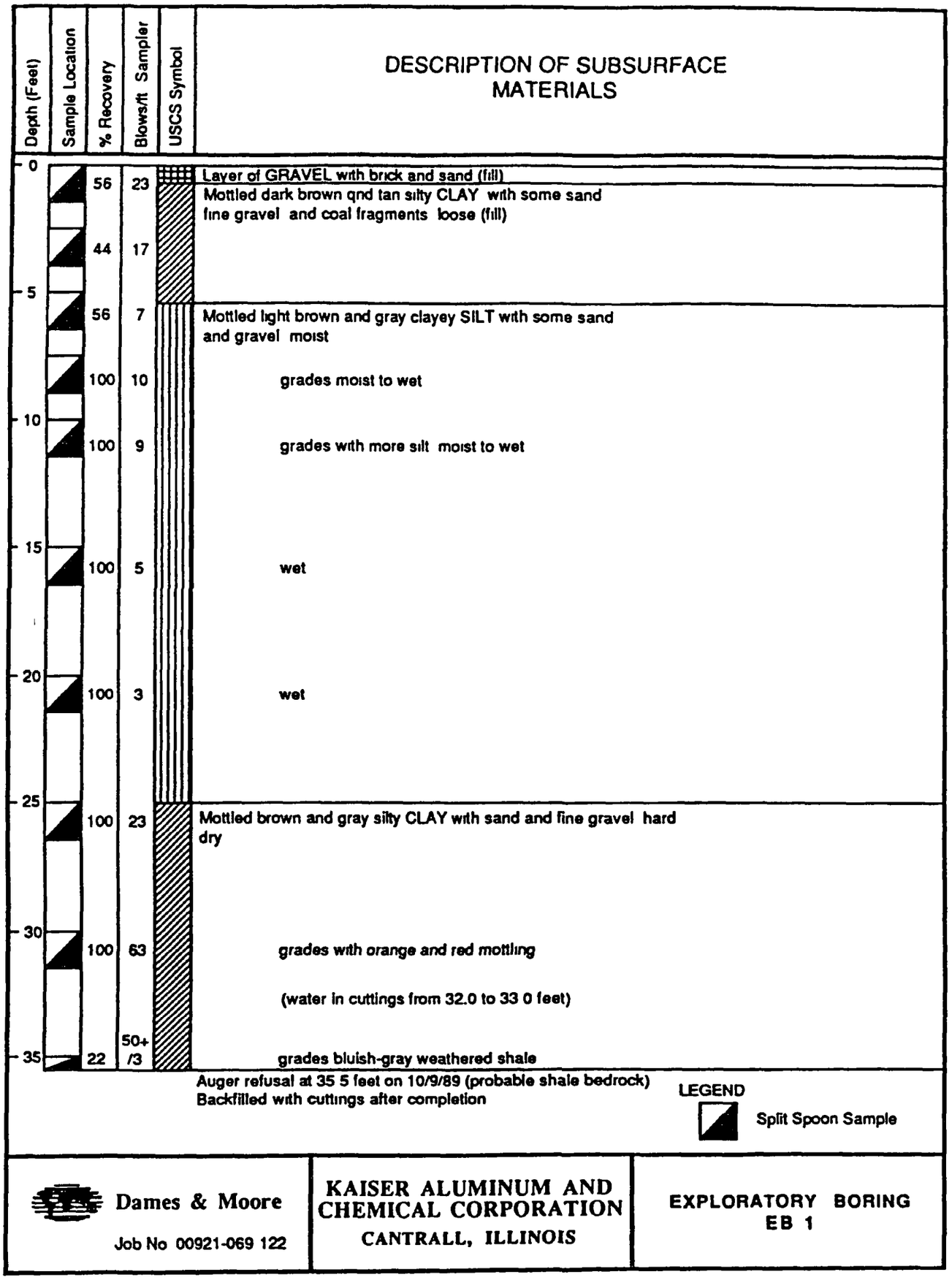
SITE VICINITY MAP

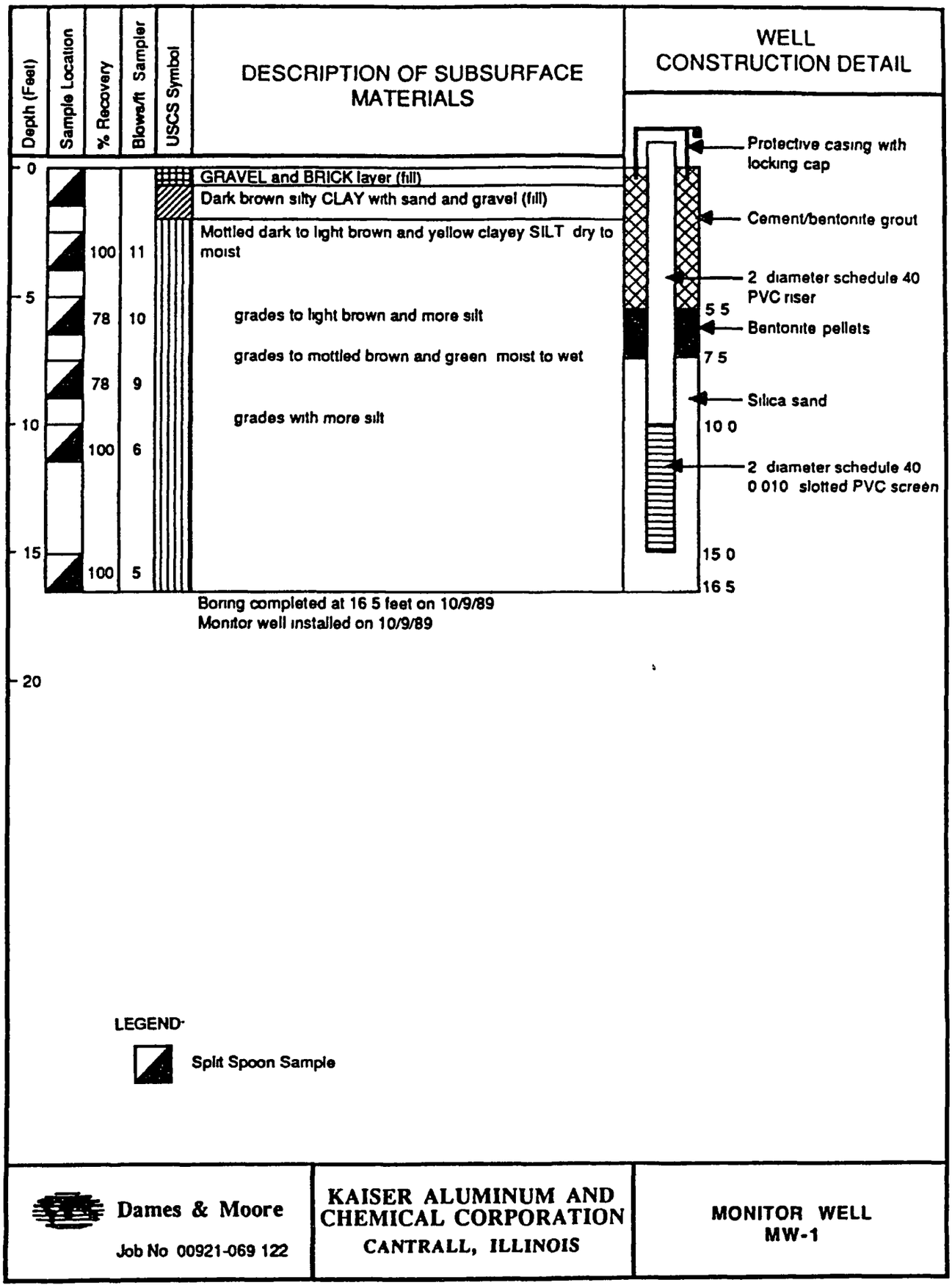
BASE MAP SOURCE USGS
7 1/2 minute topographic quad rangle map Athens Illinois 1966 photorevised 1971 and 1976

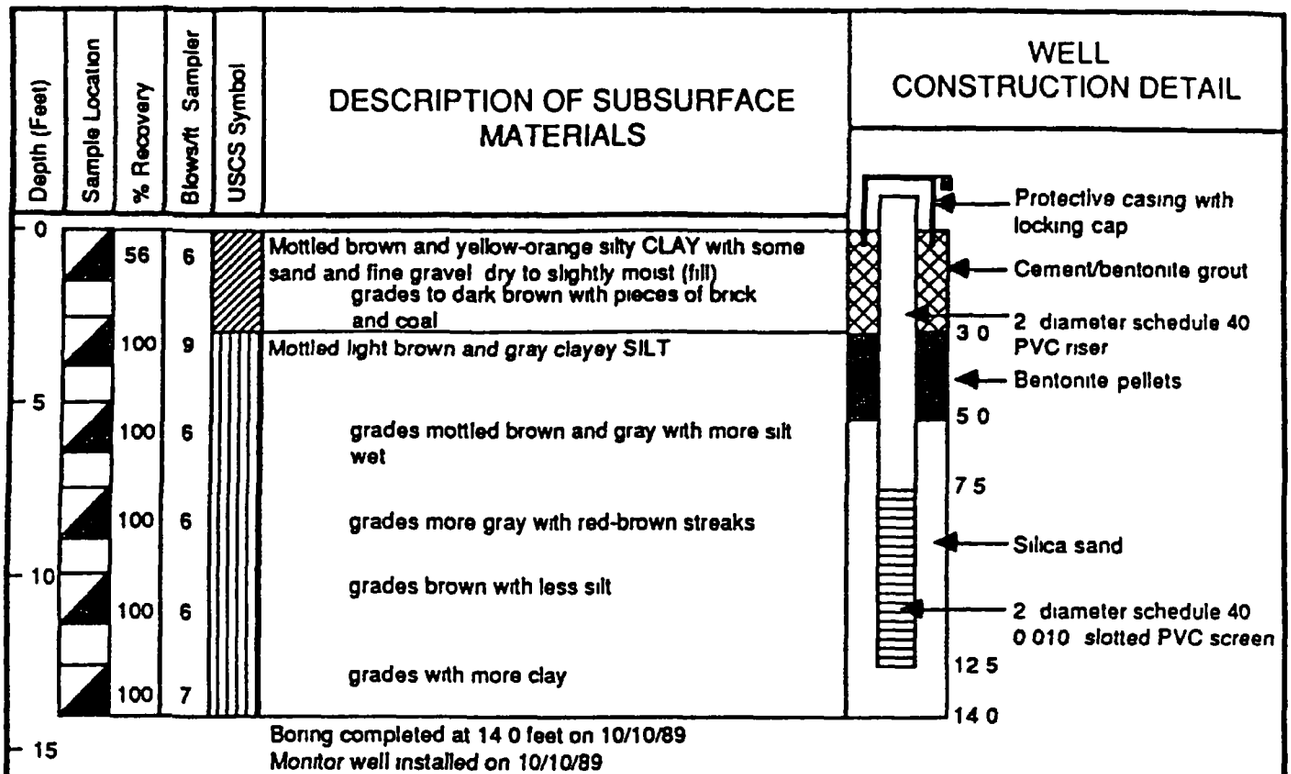
JOB NO 921-069-17 FIGURE 1 Dames & Moore


HOLLAND STREET
3RD STREET
2ND STREET
STREET SIGN
TELEPHONE BOX
85 71
MW 3
84 66
KAISER WELL
SCALE
0 212
WOOD FRAME BUILDING
SCALE
85 50
85 02
MW 1
MW 2
84 31
85 00
84 50
RAILROAD TRACKS
N
LEGEND
PROPERTY BOUNDARY
FORMER LOCATION OF ABOVE GROUND STORAGE TANK
EXISTING CONCRETE PAD LOCATION
UTILITY POLE
MW 2 MONITORING WELL LOCATION AND NUMBER
TOPOGRAPHIC CONTOUR (Contour Interval = 2 feet)
84 31 GROUND WATER ELEVATION FEET MEASURED 11/21/89
85 50 POTENTIOMETRIC SURFACE CONTOUR AND ELEVATION
0 212 GROUND WATER FLOW DIRECTION AND GRADIENT
Ground water elevations were calculated using an arbitrary elevation assigned to the Kaiser well
0 30 60
SCALE IN FEET
BASE MAP SOURCE Topographic Survey Dames & Moore Cincinnati Ohio September 1988 and Chicago and Illinois Midland Railway Company Office of the Chief Engineer Springfield Illinois April 28 1967
KAISER AGRICULTURAL CHEMICALS INC
CANTRALL ILLINOIS
GROUND WATER POTENTIOMETRIC SURFACE
JOB NO 921-069-122
FIGURE 3
Dames & Moore


HOLLAND STREET
3+50W
3+00W
2+50W
2+00W
1+50W
1+00W
0+50W
0+00W
0+00S
0+50S
1+00S
1+50S
3RD STREET
2ND STREET
STREET SIGN
TELEPHONE BOX
KAISER WELL
WOOD FRAME BUILDING
SCALE
SCALE
MW 1
MW 2
MW 3
596
594
592
590
588
568
590
592
RAILROAD TRACKS
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
LEGEND
PROPERTY BOUNDARY
FORMER LOCATION OF ABOVE GROUND STORAGE TANK
EXISTING CONCRETE PAD LOCATION
UTILITY POLE
MONITORING WELL LOCATION
SOIL SAMPLING LOCATION
DISCRETIONARY SOIL SAMPLING LOCATION
EXPLORATORY BORING LOCATION
1+50S SITE COORDINATE GRID
590 TOPOGRAPHIC CONTOUR (Contour Interval = 2 feet)
0
30
SCALE IN FEET
BASE MAP SOURCE Topographic Survey Dames & Moore Ohio September 30
and Illinois Midland Railway Company
Office of the Chief Engineer Springfield Illinois April 3 1967
KAISER AGRICULTURAL CHEMICALS INC
CANTRALL, ILLINOIS
MONITORING WELL AND SOIL SAMPLING LOCATIONS
JOB NO 921-069-122
FIGURE 2
Dames & Moore


Depth (Feet)
Sample Location
% Recovery
Blows/ft Sampler
USCS Symbol
DESCRIPTION OF SUBSURFACE MATERIALS
0
5
10
15
20
25
30
35
56
23
Layer of GRAVEL with brick and sand (fill)
Mottled dark brown qnd tan silty CLAY with some sand fine gravel and coal fragments loose (fill)
44
17
56
7
Mottled light brown and gray clayey SILT with some sand and gravel moist
100
10
grades moist to wet
100
9
grades with more silt moist to wet
100
5
wet
100
3
wet
100
23
Mottled brown and gray silty CLAY with sand and fine gravel hard dry
100
63
grades with orange and red mottling
(water in cuttings from 32.0 to 33 0 feet)
22
50+ /3
grades bluish-gray weathered shale
Auger refusal at 35 5 feet on 10/9/89 (probable shale bedrock)
Backfilled with cuttings after completion
LEGEND
Split Spoon Sample
Dames & Moore
Job No 00921-069 122
KAISER ALUMINUM AND CHEMICAL CORPORATION
CANTRALL, ILLINOIS
EXPLORATORY BORING
EB 1

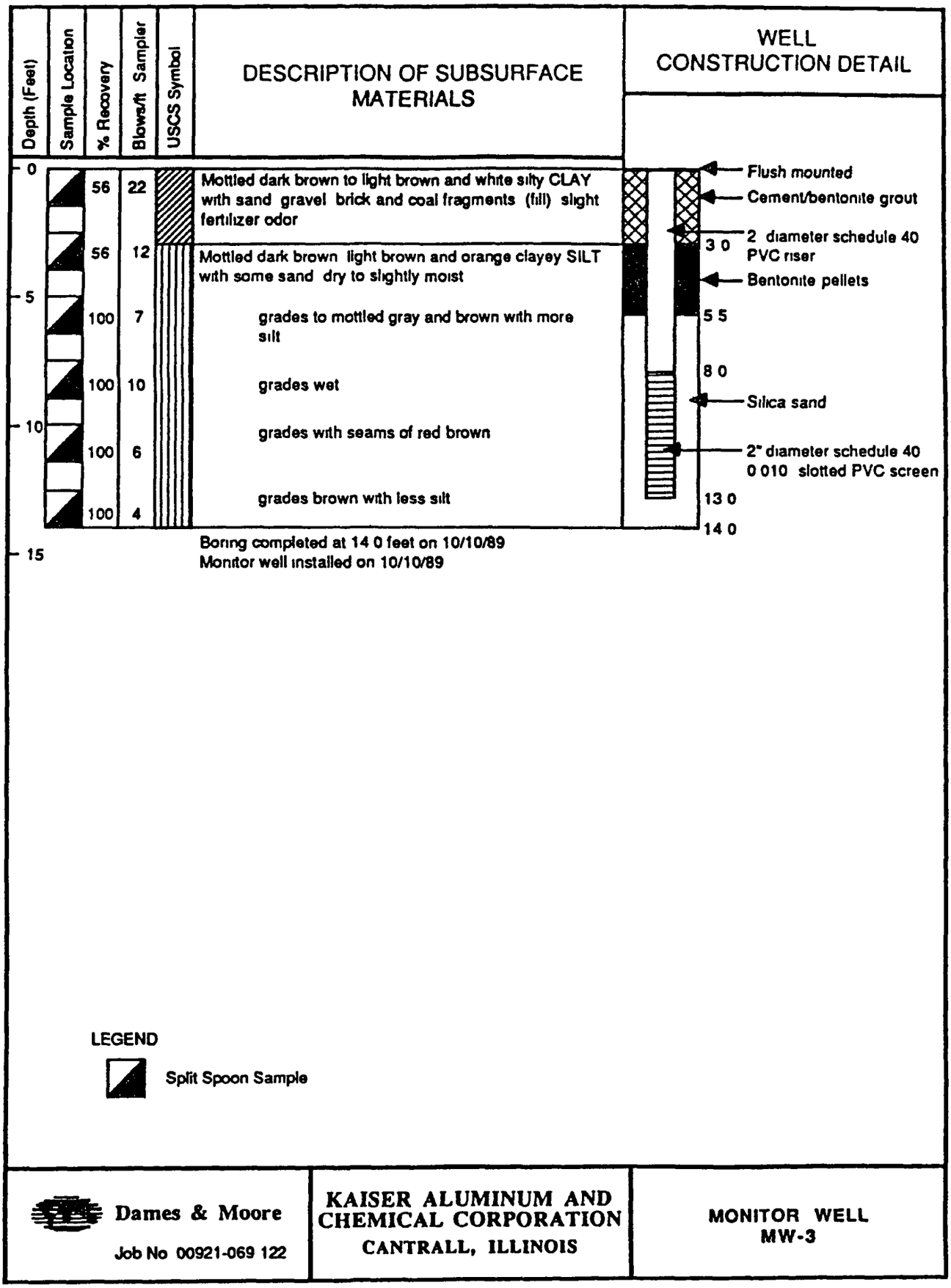

Depth (Feet)
Sample Location
% Recovery
Blows/ft Sampler
USCS Symbol
DESCRIPTION OF SUBSURFACE MATERIALS
WELL CONSTRUCTION DETAIL
0
5
10
15
20
GRAVEL and BRICK layer (fill)
Dark brown silty CLAY with sand and gravel (fill)
Mottled dark to light brown and yellow clayey SILT dry to moist
100 11
grades to light brown and more silt
78 10
grades to mottled brown and green moist to wet
78 9
grades with more silt
100 6
100 5
Boring completed at 16 5 feet on 10/9/89
Monitor well installed on 10/9/89
Protective casing with locking cap
Cement/bentonite grout
2 diameter schedule 40 PVC riser
5 5
Bentonite pellets
7 5
Silica sand
10 0
2 diameter schedule 40 0 010 slotted PVC screen
15 0
16 5
LEGEND
Split Spoon Sample
Dames & Moore
Job No 00921-069 122
KAISER ALUMINUM AND CHEMICAL CORPORATION
CANTRALL, ILLINOIS
MONITOR WELL MW-1



LEGEND:

Split Spoon Sample

Dames & Moore Job No 00921-069 122	KAISER ALUMINUM AND CHEMICAL CORPORATION CANTRALL, ILLINOIS	MONITOR WELL MW-2


Depth (Feet)
Sample Location
% Recovery
Blows/ft Sampler
USCS Symbol
DESCRIPTION OF SUBSURFACE MATERIALS
WELL CONSTRUCTION DETAIL
0
5
10
15
56
22
56
12
100
7
100
10
100
6
100
4
Mottled dark brown to light brown and white silty CLAY with sand gravel brick and coal fragments (fill) slight fertilizer odor
Mottled dark brown light brown and orange clayey SILT with some sand dry to slightly moist
grades to mottled gray and brown with more silt
grades wet
grades with seams of red brown
grades brown with less silt
Boring completed at 14 0 feet on 10/10/89
Monitor well installed on 10/10/89
Flush mounted
Cement/bentonite grout
2 diameter schedule 40 PVC riser
3 0
Bentonite pellets
5 5
8 0
Silica sand
2" diameter schedule 40 0 010 slotted PVC screen
13 0
14 0
LEGEND
Split Spoon Sample
Dames & Moore
Job No 00921-069 122
KAISER ALUMINUM AND CHEMICAL CORPORATION
CANTRALL, ILLINOIS
MONITOR WELL
MW-3

LABORATORIES, Inc.

Report To: Dames & Moore
644 Linn Street, Suite 105
Cincinnati, OH 45203
Attn: Dave Click

Date: August 6, 1990
Work Order: 21-3487
Date Received: 11-27-90

Sample Matrix: Water

RE: Kaiser-Cantrall (11-21-89) Project #: 00921-069

ANALYZED FOR LASSO, ATRAZINE, BUTYLATE, METRIBUZIN, & DUAL:
ANALYSES (PPB)

Sample I D	Lab# 6543 MW-1	6544 MW-2	Minimum Detectable Level/ppb
Lasso/ppb	11 86	72 55	0 05
Atrazine/ppb	196 20	526 04	0 5
Butylate/ppb	3 9	87 4	2 0
Metribuzin/ppb	75 01	31 50	0 015
Dual/ppb	14 03	69 42	0 05

Report approved by Warren Schulz,
Organics Lab Chemist
By and for Minnesota Valley Testing Labs, Inc
/AK

MVTL warrants the accurate analysis of the sample delivered. The expected effectiveness and safety of the analyte for any purpose is not certified herein because of environmental factors affecting its use, including variable soil, weather, time lapse, water and other conditions

MVTL LABORATORIES, Inc.
P O BOX 249
NEW ULM MN 56073 0249
PHONE (507) 354 8517 WATS (800) 782 3557 FAX (507) 359 2890

Report To:
DAMES & MOORE

Date Reported: 12/11/89
Date Received: 11/09/89
Work Order #: 21-3487

Sample Identification: 11/07/89

Analyte		MW-1	MW-2
Mineral Nitrogen	mg/L	<0 19	0 53
Ammonia Nitrogen	mg/L	3 36	1 61
Nitrate Nitrogen	mg/L	193	786
Phosphorus	mg/L	1 62	12 6
Incubated Ammonia	mg/L	3 45	2 14

REVISED COPY
8/08/90

Report approved by:
David R Pearson
By and for Minnesota Valley Testing Labs, Inc